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ABSTRACT

The purpose of this study was to determine the various ways in which audience members recall and quantify messages coming through the different media. The data presented here were collected during the course of a panel study into the social context of mass media use. The measurement and analytic techniques are exploratory. The respondents were adolescents, sampled from two midwestern cities on a geographic probability basis. The study was partially successful in utilizing multidimensional scaling to represent earlier chi-square analysis, and other dimensions and configurations for characterizing the media were discovered. The findings of the study are presented in both table and narrative form. (RB)

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APPROACHES TO CHARACTERIZING INFORMATION ENVIRONMENTS

Paper presented to the session in Analytical Techniques and Methodology in Communication Research at the International Communication Association, New Orleans, April, 1974

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An Approach to Mass Media Channel Informativeness

Both communicators and audience members commonly make judgments about the mass media channels which carry information. The communicator is often concerned about choosing a channel which maximizes an audience for his message. Given the choice of one of the mass media channels, the communicator looks for the best ways to use these channels in presenting his ideas. The audience member, on the other hand, can be said to have certain needs for a particular kind and amount of information about some topic. One would suppose, then, that the audience members have some notions about what channels are most likely to have the information they seek. The amount and kinds of messages about some topic available in mass media channels and perceived by audience members is at least in part a function of these expectations of the communicator and audience member.

In this paper, we take advantage of the recall of audience members to quantify in various ways the nature of media channels. Through a measurement approach called message discrimination, we, in effect, let the audience member content analyze the media for us with regard to certain topics. With their responses, we attempt to characterize mass media channels; first from a deductive, theoretically based approach rooted in information theory, and later in an inductive manner through multi-dimensional analysis. Attempts are made to link the two analytic approaches, and to the extent that the methods are complementary, to shed some light on the dimensions upon which media may be compared.

We are not completely successful in these goals, and to some degree the work presented here must be considered preliminary and speculative.

Yet the explication of the measurement and analytic techniques employed may have some heuristic value, and their usefulness will hopefully invite their application in future research efforts. Our purpose here, however, is exploratory.

The data presented were collected during the course of a panel study into the social context of mass media use. The respondents are adolescents, sampled from two midwestern cities on a geographic probability basis. They were questioned about four topics; family planning, occupational aspirations, drug use and abuse and alcohol use and abuse. We deal here only with responses to the first two topics, obtained in interviews in early 1973 from 537 respondents.

2. Message Discrimination: Theory and Measurement

We wish to describe the information environment surrounding audience members in terms of the messages they perceive and recall from mass media channels. Specifically, we want to obtain a measure of both the type and amount of information adolescents are able to gain from seven different mass media channels about particular topics. We are trying to capture those symbols audience members have perceived and are able to recall from mass media channels about a specified object (Clarke and Kline, 1974). In more substantive analysis following a "uses and gratifications" approach (Kline, Miller, Morrison, In press) we have found relationships between the number of messages discriminated and knowledge congruency and interpersonal communication with significant others surrounding the adolescent. In this paper, we are attempting to expand on the usefulness and interpretation of data collected through this message discrimination approach.

The general form of the message discrimination question as it was used in a face-to-face interview setting was as follows: "What have you (read,

heard, seen) in a (specific mass media channel) in the (specific time frame) about (a single topic)?" Embedded in the question, as indicated by the parantheses here, are four cues to provide a framework within which our respondent is asked to recall as many messages as he is able. Each message discrimination is constrained to a particular mass media channel with the appropriate mode of gaining information from that channel. Thus, we ask the same question about seven mass media channels including newspapers, books and pamphlets, magazines, television, films, (other than those on television), billboards, and radio.

The cues provided in the questions also bound message discrimination by time and topic. Thus, we specified a particular time period where we hoped that respondents could reasonably be expected to recall at least portions of messages that they had perceived in any mass media channel. Further, each message discrimination measure focuses on one subject at a time so that we might allow the respondent to expand at some length about messages relating to any one topic. Within the guidance and constraints provided by these cues, we feel that we are able to capture that portion of the information available in a particular channel about a specific topic which has been perceived by the audience and has had enough impact to allow recall about that information during the interview process.

It is, of course, possible to identify several sources of potential error in this data collection method. For example, some respondents may have difficulty responding to open-ended questions such as these either because of a lack in oral expression skills, disinterest in the task or topic at hand, or some other sensitivity to the interviewing process.

There is also variance in interviewers' ability to record responses verbatim, since, for example, a series of disjointed phrases from several messages may be the extent of a respondent's recall. One must also take into account the differential ability of coders to separate out and interpret each unique piece of information recorded for a respondent. However, we have no reason to expect that there is any systematic error in the responses by any particular group of respondents, for any mass media channels, on any particular topic.

Collecting message discrimination data seems to us to better approximate how the mass media is used by an audience than the more common measures of frequency of mass media channel use or porportions of time spent with mass media channels (See Troldahl, 1965; McLeod and O'Keefe, 1972). These communication variables are often used in association with other measures of knowledge or attitude holding about a particular topic. The message discrimination measurement technique makes manifest how information gained by a respondent from a particular channel relates to his holding or evaluation of other information. Additionally, this measure also allows for the construction of an index of sheer number of messages recalled by the respondent per mass media channel.

We also feel that the pattern of messages recalled about different topics within and across mass media channels serves as a fair approximation of the pattern of information which might be obtained if we were to content analyze each channel. For example, Clarke and Kline (1974) showed that the content of messages discriminated about family planning in newspapers by these respondents reflected fairly closely a content analysis of the same topic in newspapers found in our sampling areas.

Thus, data collected through the message discrimination technique seems to offer the avenue by which we may interpret the usefulness and impact of the mass media message environment.

3. Message Discrimination: Data

The measurement technique outlined above was used to construct seven cued, open-ended questions corresponding to the seven mass media channels for both topics of occupational aspirations and family planning. Two types of data were derived from the seven questions for each topic. First, for each channel we count the number of messages recalled by each respondent. We then sum the number of respondents who recalled from one to five or more messages for each channel. Our intention with this data is to look for patterns of channel use in terms of respondents perceiving the majority of their recalled messages about a topic in a particular set of channels. For example, one might expect that a heavy use of television for messages will relate to heavier use of other audio or audio visual channels like radio and films. The distribution of numbers of messages per channel for both topics of occupational aspirations and family planning are arranged in Table Ia and Ib respectively.

Each unique message recalled by our respondents is also coded into a set of content categories for each topic. For the topic area of occupational aspirations, two basic kinds of content were coded. Each separate job name mentioned as part of a recalled message was coded. The other pieces of information that were coded in recalled job messages were job attributes. For purposes of analysis in this paper, job attributes were summed across a rather complex coding scheme into seven categories: 1) mentions of the availability of jobs; 2) mentions of educational opportunities related to gaining a job; 3) mentions of education requirements needed for getting

TABLE I

Number of Respondents Who Discriminated Messages
For Job Aspirations and Family Planning

Ia) Job Aspirations -- range is 0 to 3 messages N=537

	0	1	2	3
Newspapers	420	91	21	5
Books and Pamphlets	381	120	27	9
Magazines	465	53	18	1
Television	376	124	32	4
Film	431	92	13	1
Billboards	423	109	5	0
Radio	412	106	16	3

Ib) Family Planning -- range is 0 to 4 messages N-536

	0	1	2	3	4
Newspapers	416	89	23	5	3
Books and Pamphlets	413	94	22	5	2
Magazines	418	86	26	5	1
Television	203	219	87	25	2
Film	463	58	12	3	0
Billboards	415	90	25	6	0
Radio	407	102	22	3	2

specific jobs; 4) other requirements such as skills or experience needed for particular jobs; 5) rewards one might obtain for doing a job; 6) mentions concerning the respondent's recollection of messages observing that a particular mass media channel is a good place to get job information (want ads in newspapers, for example); and 7) other information about job training programs like ROTC and volunteer job opportunities. This job attribute data will be analyzed later in this paper.

Family planning messages recalled by our adolescent respondents were also summed across the detailed coding scheme into seven categories: 1) messages about planned parenthood or other clinics; 2) mentions of messages about various aspects of the issue of abortion; 3) mentions of birth control methods; 4) mentions of reasons for using birth control methods; 5) mentions of problems of overpopulation; 6) mentions of decisions concerning marriage and raising a family related to family planning; and 7) other information about family planning related issues including messages concerning the best sources for family planning information. The frequency distributions of content areas by channels for job aspirations and family planning are displayed in tables IIa and IIb respectively.

4. Comparing Mass Media Channels by Content Distributions

One set of data for both job aspirations and family planning is the count of the number of messages in each of seven unique content categories for each of seven mass media channels. Basic to discussion of analyses appropriate for nominal level data (e.g., Hays, 1973; McNemar, 1962) is the idea that a distribution of observed items over several nominal categories may be compared to some hypothetical distribution of these same

TABLE II

Content Distributions Across Seven Mass Media Channels
For Job Aspirations and Family Planning

IIa) Job Aspirations

	Job Availability	Educational Opportunity	Educational Requirement	Other Requirements	Rewards	Uses Mass Media	Other	Total
Newspaper	45%(62)	4 (5)	13 (18)	8 (11)	7 (9)	20 (27)	4 (6)	100 (138)
Books and Pamphlets	22 (40)	9 (16)	28 (51)	17 (31)	14 (26)	3 (6)	6 (10)	100 (180)
Magazines	37 (33)	7 (6)	21 (19)	9 (8)	18 (16)	6 (5)	2 (2)	100 (89)
Television	25 (48)	17 (33)	27 (52)	7 (13)	9 (17)	8 (15)	8 (16)	100 (194)
Film	22 (25)	10 (11)	19 (22)	19 (22)	3 (3)	13 (15)	14 (16)	100 (114)
Billboard	45 (53)	21 (25)	8 (10)	5 (6)	4 (5)	9 (11)	7 (8)	100 (118)
Radio	34 (45)	12 (16)	27 (36)	7 (9)	2 (3)	6 (8)	12 (16)	100 (133)
Total	32 (306)	12 (112)	22 (208)	10 (100)	8 (79)	9 (87)	7 (74)	100 (966)

TABLE II

Content Distributions Across Seven Mass Media Channels
For Job Aspirations and Family Planning

IIb) Family Planning

	Planned Parenthood	Abortion	Methods	Reasons	Over Population	Marriage and Family	Other	Total
Newspapers	11%(17)	25 (38)	12 (19)	6 (9)	30 (46)	15 (23)	1 (2)	100 (154)
Books and Pamphlets	15 (23)	13 (20)	16 (24)	15 (23)	12 (18)	24 (36)	6 (9)	100 (153)
Magazines	10 (15)	15 (22)	19 (29)	11 (16)	16 (24)	23 (34)	7 (11)	100 (151)
Television	31 (82)	10 (28)	3 (9)	7 (20)	12 (33)	24 (64)	12 (32)	100 (268)
Film	6 (5)	20 (16)	10 (8)	18 (15)	10 (8)	22 (18)	15 (12)	100 (82)
Billboards	35 (54)	31 (48)	11 (17)	3 (5)	3 (4)	11 (17)	5 (8)	100 (153)
Radio	49 (78)	14 (22)	3 (5)	4 (7)	4 (6)	13 (20)	13 (21)	100 (159)
Total	24 (274)	17 (194)	10 (111)	8 (95)	12 (139)	19 (212)	8 (95)	100 (1120)

items by the chi-square statistic. The use of the chi-square distribution for one-way contingency tables with large N's (as is the case here) is conceived of as a measure of the "goodness of fit" between the observed and hypothesized distributions. We can construct a chi-square in each of our seven one-way contingency tables for each channel by content categories with the familiar formula

$$\chi^2 = \frac{(fo-fe)^2}{fe}$$

The expected frequencies will be derived from the different theoretical distributions of items over content categories.

One way to characterize the qualitative or content attributes of the mass media message environment is in terms of the repetitiveness with which content similar messages are recalled for each particular channel. If the availability of family planning information about birth control methods was constrained mostly to books and pamphlets and films shown in family planning courses at school, then one would expect a relatively heavy recall of those messages in those channels only. Correspondingly, if we find family planning information of every kind is available in some channel, we would expect to find an even distribution of recalled messages over all content areas for that channel. Of course, we must be careful not to mistake recall of a particularly well-displayed or attention-capturing message in a content area for a real preponderance of that kind of content over other kinds of messages in a channel.

One might argue that there is more information in a channel which carries many messages about a specific topic that have equal display than in a channel which carries predominantly one kind of information. The

conceptual roots for this notion are found in the measures of information theory (Garner, 1962). We are arguing that there is more uncertainty (hence, more information) if messages in a channel have an equal probability of being perceived and recalled because they are evenly displayed in that channel. It is not clear, of course, that a redundant or repetitive set of messages in one channel is less important for a particular respondent than a diffuse set of messages in another channel in terms of the needs of that respondent for particular kinds of information. If, for example, a respondent needed clinical help, repeated messages about how to locate the appropriate clinic may be central for that respondent in terms of getting the needed help. However, if the issue for respondents is the general acquisition of all kinds of information about a particular topic, then we would say that that channel which carries "something about everything" in relatively equal portions is the more informative channel.

The hypothetical distribution of messages which describes maximum informativeness is one in which an equal number of responses would be found in the content categories that we have constructed for each topic. The distribution of observed versus expected frequencies of family planning messages for radio and films in Table III exemplifies the data used to construct our X^2 statistic. The expected rectangular distribution is simply the total number of messages in a channel divided by the total number of content categories.

Chi-squares were calculated for the distributions of both family planning and job attribute messages in each of the seven mass media channels. The interpretation of the chi-square is that the smaller the chi-square, the less deviation from a fit between the observed and hypothesized distributions. Thus, the range of chi-square from small to large

TABLE III

Examples of Construction of Informativeness
Chi-Square Comparison

		Planned Parenthood & Other Clinics	Abort	Birth Control Methods	Reasons for Birth Birth Control	Over Popula-tion	Marriage and Family	Other	Total Messages
Film	Observed Frequency	5	16	8	15	8	18	12	82
	Expected Frequency	11.7	11.7	11.7	11.7	11.7	11.7	11.7	82

$X^2 = 12.09$ with 6d.f.

Radio	Observed Frequency	78	22	5	7	6	20	21	159
	Expected Frequency	22.7	22.7	22.7	22.7	22.7	22.7	22.7	159

$X^2 = 172.4$ with 6 d.f.

represents, respectively, the most informative rectangularly distributed messages) to most redundant (messages concentrated in a very few content areas) channels. The chi-squares for all channels for both topics are arrayed in Table IV.

We find for the topic of family planning that messages recalled from films other than those on television appears to have covered the range of content categories most evenly and define one end of our informativeness continuum of mass media channels. It is interesting to note that the lowest number of messages are recalled in films not on television, yet the information in these messages is distributed most evenly over our seven content categories. For this topic, this may be a clue as to the design and impact of health or family planning courses adolescents encounter in school. For example, a series of films might range over several topics but have relatively less impact in terms of number of messages recalled because each film is only seen once.

The three print media come next with newspapers deviating most from the hypothesized square distribution. If we turn back to our original frequency distributions in Table IIb, we find that the deviation in newspapers is mainly caused by a concentration of messages in the abortion and over-population areas. Television, billboards, and radio all have observed message distributions which vary considerably from the hypothesized square distribution. For each of these channels, the heavy recall of planned parenthood and clinic messages contributes the most to the large chi-square. Billboards also happened to contain a large portion of abortion messages relative to other channels.

TABLE IV

Rank order of channels by
Informativeness for topics

Channel	Family Planning			Job Attributes		
	X^2	Rank	N	X^2	Rank	N
Film	12.09	1	82	21.30	1	114
Books & Pamphlets	17.85	2	153	62.31	4	180
Magazines	18.61	3	151	50.80	2	89
Newspapers	63.92	4	154	123.84	7	138
Television	102.80	5	268	59.90	3	194
Billboards	116.85	6	153	105.97	6	118
Radio	172.14	7	159	76.83	5	133

We would argue that the concept of informativeness in terms of an even distribution of messages across several content categories can be used to describe the relationship of mass media channels to each other for any topic. However, it is clear that the particular ordering of channels for the family planning is unique to that topic. For example, we would not necessarily expect films to carry several kinds of information in equal proportion for another topic area. Conversely, one might expect newspapers to have a much more even distribution of something like categories of sports news over a particular time period than categories of family planning information.

The ordering of mass media channels for observed job attribute messages is different than for the family planning topic. Although we still find films defining the end of the continuum closest to the theoretical distribution, the newspaper now is the channel that appears to have its messages most concentrated in one or two content areas. Messages about job availabilities are obviously concentrated in the newspaper want-ads. Thus, we do find that the ordering of channels according to informativeness is bound by the constraints of the topic under consideration. However, in our subsequent analysis using multi-dimensional techniques, we will look for the appearance of this ordering in the similarity relationships between mass media channels in terms of constructed measures of association utilizing both content distributions and frequency distributions of recalled messages.

A Multi-dimensional Analysis of Channels

1. Introduction to the method

Thus far, we have illustrated a method for characterizing media which attempts to gauge the fit between recalled media content (message discrimin-

ation) and some hypothetical distribution of content which might be termed "informativeness." This analysis has yielded a picture of the various channels which could be useful to a communicator in selecting channels for carrying a message as well as to the investigator who is concerned with quantification of the relative value of a particular channel for presentation of a certain topic.

Our purpose in this section of the paper is to present yet another method for deriving a "picture" of media channels, this time through a more inductive procedure. Utilizing measures of similarity among media, derived from the message discrimination indices explicated above, we can locate media in a multi-dimensional space.

The requirements of brevity do not permit a thorough examination of the technical aspects of multi-dimensional scaling (MDS hereafter). For this information, the reader is directed to seminal works by Shepard (1962), Kruskal (1964a, 1964b), Coombs (1958) and Shepard, Romney, and Nerlove (1972). On an intuitive level, however, MDS may be represented as a means for obtaining a spatial configuration of stimuli or objects (media in our case) from a matrix of associations among the stimuli. The theory behind the algorithm takes advantage of the fact that the concept of similarity is the most basic perceptual frame (Carroll and Wish, 1973). When perceiving objects we organize them into categories, and this category system is based on similarities and differences between objects. MDS addresses itself to the question of how objects are similar or different (that is, to the question of what dimensions make pairs of objects similar or different). Having arrived at a solution to this matter, the objects may be placed in some spatial position on each of the dimensions.

We might take a closer look at how this placement of an object is obtained in the scaling process. A matrix of similarity measures among the objects is used as input for the algorithm of the MDS computer program (many such programs exist, although the Kruskal MDSCAL and Guttman-Lingoes SSA series are probably most familiar). These measures of similarity may be ordered as to their magnitude, and regarded as distances among objects. That is, if two objects are highly similar according to some measure (for example, if they have a high Pearson product-moment correlation), then the distance between them in the space will be very small. If, however, the similarity measure between two objects is low in value, the distance between the objects will be large. It is important to note, then, that the MDS algorithm takes as input an ordering on all of the distances among stimuli and finds a solution which arrays the stimuli in an r-dimensional space to fit this ordering of distances.

One further feature is built into all MDS programs. In general, it is easier to find a good fit of the MDS configuration to the input similarities data as the number of dimensions in the solution increases. It is obvious that if the number of dimensions allowed for a solution were to equal the number of objects, the ordering of distances among the objects could be easily maintained. But such a "loose" solution is unrewarding conceptually, since we would like to find the most parsimonious set of dimensions which could be used to distinguish between objects. If one dimension were allowed for each object, we learn nothing about how objects differ. This solution would tell us only that the objects "differ because they are different."

Therefore, we wish to minimize the number of dimensions in the scaling solution, without doing too much damage to the representation of the distances in the space. Most of the MDS programs, then, iterate from higher to lower dimensional solutions, and measure the degree of fit between the original data and the spatial configuration at each level of dimensionality. By examining these measures of fit (stress in Kruskal's terminology) we can make a judgment as to how many dimensions are required to depict the data with some accuracy. We look for the best fit in the smallest number of dimensions.

The aim of MDS, then, is to discover the number of dimensions relevant to the similarity between objects, and to determine the object coordinates on the dimensions. The problem of interpretation is to specify the meaning of the dimensions in some way.

With this brief overview of MDS in mind, let us consider how an analysis of this type might be relevant to the problem of characterizing media channels. We have seen, earlier in this paper, how channels can be described taking an a priori theoretical approach. Borrowing from information theory, we saw that media could be described by their relative similarity in content to a hypothetically informative distribution of content. With measures of similarity among the channels, we may, through MDS, derive a similar dimensional interpretation of the channels. That is, we may empirically discover an informativeness dimension with our dimensional analysis. Such a finding would lend some convergent validity to the information theory perspective, in that it would be a second measurement of a construct (informativeness) using a different method (see Campbell

and Fiske, 1959). Moreover, and perhaps more likely, we may find other dimensions which are useful for characterizing the media.

There are pitfalls in analyses of this type, however. Exceedingly complex objects such as media channels are likely to be best described in configurations of larger dimensionality, whose interpretation may be difficult. Vagaries of the scaling procedure such as local minima solutions and poor starting configurations may hamper the investigator in his effort to understand the solutions. Repeated scaling analyses of the same data are often called for. Apart from technical problems, we may not discover any dimensions or clusters in the solutions which resemble the informativeness characterization presented earlier. In this case, several interpretations are possible: 1) the informativeness dimension found earlier in the paper should be discarded because it was not replicated; 2) the MDS solution should be disregarded because it failed to replicate the informativeness analysis; 3) both analyses should be thrown out because they have led to more confusion than insight. If patience prevails over petulance, none of these interpretations need be accepted. Should the MDS analysis fail to replicate the chi-square analysis, we may still learn something about the characterization of media. Other kinds of informativeness may occur to us as we examine the solutions, and we may find interesting topic differences.

Thus we are placing a very rigorous test on the chi-square analysis. If the informativeness notion passes the test, we have found something important. If not, we do not have to discard everything, but rather refine or redefine our ideas and measurements and perform other tests. There is much to be learned, of course, from the testing procedure itself, as we are attempting to show in this methodological paper.

2. Procedure

Message discrimination scores for the seven media channels were computed across the sample of respondents in two ways for analysis. As described earlier in the paper, the media were scored according to the sheer frequency of messages which were perceived in each channel. These scores are summarized in Table I. Secondly, the media were scored according to the frequency of messages perceived by respondents in all of the content categories for each of the two topics. These scores are displayed in Table IIa-b.

What we have, then, is two bases for computing similarity among media which may be input to MDS. The first score may be seen to address the sheer frequency of a perceptual recall for a channel where a similarity measure for two channels computed from these scores is interpreted as a frequency of recalled message similarity between the channels. That is, the more messages perceived in one channel, the more perceived in a similar channel, according to this measure. Content similarity, on the other hand, is what is obtained from the second basis of similarity. In order for media to be similar in this case, they must carry the same types of content relatively frequently.

These two notions of similarity provide us with the opportunity to test our earlier informativeness findings in four ways. The number of messages recalled similarities may be input to MDS for both jobs and family planning. These two solutions would provide cross-topic tests using one type of similarity measure. The content similarities may also be analyzed across the two topics, which would provide two more tests with a different similarity measure. If these solutions were to reveal similar dimensions

to those elucidated earlier as informativeness, we would have several independent (in terms of topic and similarity measure) checks on our informativeness notion.

The rationale for using number of recalled messages and content similarities is this; if we can assume the proposition that people use the media with some purpose, or according to some underlying dimension, the similarities corresponding to the number of recalled messages would identify this dimension and perhaps one of the dimensions is informativeness as measured by the chi-square analysis. Correspondingly, if people tend to identify similarities and differences among media in the kind of content they present, perhaps part of this identification is a factor which we might find to be the chi-square informativeness. If the solutions within a topic are similar for the frequency of messages recalled and content similarities, we would argue for an association between the frequency a medium has been used and the content carried by the medium. Theoretically, however, we can distinguish between what a medium carries and its frequency of messages. We would thus expect different types of solutions using the two similarity measures within a topic. Comparing frequency of messages recalled and content similarity solutions across topics, we would examine the stability of any dimensions derived from the analyses.

The similarities measures input to MDS are product-moment correlation coefficients and contingency coefficients, for the frequency of messages recalled and content bases, respectively. The correlation coefficient is appropriate to gauge the association among media with regard to the "number of messages" score. The contingency coefficient, on the other hand is appropriate to the nominal content frequencies; each coefficient being

TABLE 5a

Product-Moment Correlations Among Media for Family Planning Topic, Based on Usage Scores

	Newspapers	Books/Pamphlets	Magazines	Television	Film	Billboards	Radio
Newspapers	----						
Books/Pamphlets	.370	----					
Magazines	.415	.279	----				
Television	.279	.073	.118	----			
Film	.180	.222	.123	.009	----		
Billboards	.353	.306	.283	.183	.024	----	
Radio	.244	.203	.199	.170	.032	.244	----

TABLE 5b

Product-Moment Correlations Among Media for Jobs Topic, Based on Usage Scores

	Newspapers	Books/Pamphlets	Magazines	Television	Film	Billboards	Radio
Newspapers	----						
Books/Pamphlets	.145	----					
Magazines	.101	.142	----				
Television	.065	.076	.032	----			
Film	.058	.097	-.031	-.031	----		
Billboards	.075	.106	.096	.167	-.042	----	
Radio	-.015	.074	.094	.136	.013	.153	----

TABLE 5c

Contingency Coefficients among Media for Family Planning Topic, Based on Content Scores

	Newspapers	Books/Pamphlets	Magazines	Television	Film	Billboards	Radio
Newspapers	---						
Books/Pamphlets	.58	---					
Magazines	.58	.59	---				
Television	.52	.39	.40	---			
Films	.46	.46	.32	.35	---		
Billboards	.46	.46	.43	.49	.36	---	
Radio	.47	.43	.41	.45	.30	.48	---

TABLE 5d

Contingency Coefficients among Media for Jobs Topic, Based on Content Scores

	Newspapers	Books/Pamphlets	Magazines	Television	Film	Billboards	Radio
Newspapers	---						
Books/Pamphlets	.40	---					
Magazines	.29	.34	---				
Television	.31	.31	.36	---			
Films	.28	.54	.30	.27	---		
Billboards	.28	.29	.36	.46	.23	---	
Radio	.43	.27	.34	.33	.29	.45	---

obtained from a two-way table between each pair of media. The matrices are presented in Table 5a-d.

The four similarity matrices were utilized in the Kruskal MDSCAL 5 program. Solutions for three down to one dimensions were requested, and the solution with the appropriate stress measure for each similarity matrix was chosen for presentation here.

3. Findings

We undertook the following procedure in examining the four MDS solutions presented in Figures 1-4. First, a comparison of frequency of messages recalled and content similarity solutions is made across topics in an attempt to find meaningful dimensions which will hold across topics. Secondly, we consider the spatial configurations of the media to note similarities and differences between topics. The following questions will guide our search: Can the chi-square informativeness analysis performed earlier shed any light on the interpretation of dimensions? What other types of dimensions can be found? How can the configuration of media in the multidimensional space be interpreted?

Figures 1 and 2 depict the MDS solutions for family planning and job attribute similarities, respectively in terms of the number of messages recalled. The first thing to note is that the solutions differ in the number of dimensions required to obtain an appropriate fit as defined by the stress value. We can say immediately, then, that the job attribute similarities require a more complex space (three dimensions vs. two for family planning) in which to be spatially arrayed. This means that there are more factors which must be considered in interpreting the frequency

similarity between media for the jobs topic.

Apart from this, we note one striking similarity between the solutions. The second dimension (depth) in each is a clear "audio-visual-print" dimension, with all of the print media (including billboards) in the"back" of the configuration, and the audio-visual media in the "front." Our interpretation of this finding is that the frequency of recall for channels by the audience depends upon the electronic or print character of the channels, and this finding is replicated across topics.

What about informativeness, as we described it in the first part of the paper? The first (horizontal) dimension in the family planning solution nearly replicates this dimension, with the exception that television and radio are reversed in order (refer to Table IIIa). We could argue, perhaps, that the dimension does seem to be present for the most part and that this is another criterion used by the audience in its media behavior.

The case of the job attributes solution is quite different. No dimension comes close to replicating the informativeness dimension reported in Table III. Rather than being disappointed with this finding, we are eager to point out the interesting topic differences in the solutions. The jobs attributes solution is more complex and reveals other kinds of dimensions which may contribute to informativeness. First, we note the clusters of magazines-newspapers-books (back, right) and television-radio-billboards (front, right). There is something like a "private" vs. "public" quality to these clusters, respectively. Moreover, four media extend below the plane (television, billboards, books, and newspapers) while three are above (magazines, film, and radio). Could this be because of differences in content in these media, where those below the plane

stress such things as the availability of jobs, while those above stress other attributes such as educational requirements and rewards? One could make such an interpretation, and thus lead to the conclusion that informativeness in the case of jobs is a multidimensional, rather than unidimensional phenomenon. The odd medium in the solution is film which could be expected to be such because of the relative lack of mentions of messages for this medium.

We may sum up the comparison of frequency of recall of messages similarity solutions for the two topics as follows. There is a clear audio-visual-print dimension which holds across topics. The family planning topic has a simpler solution for the media than does jobs, and the chi-square informativeness dimension seems to describe quite well a dimension in the solution on which media differ. These two dimensions, audio-visual-print and our informativeness measure characterize media for the topic of family planning, at least with regard to frequency of recalled messages.

In the case of jobs, however, we find that a more complex solution is required, and that our informativeness measure is not a useful tool for describing any of the dimensions in the solution. Other criteria, such as the public vs. private character of the media as well as content differences may well be important to characterize the media for this topic. Informativeness would seem to be multidimensional for the jobs topic.

Now let us turn to an examination of Figures 3 and 4, which present the MDS solutions for content similarities among media for family planning and jobs. In this case, both solutions are three dimensional. We might expect this since we are utilizing a more complicated measure of similarity

in this case. The content perceived in a channel is clearly more complex than a simple count of the number of messages in the channel. We see this reflected in the solutions.

Looking at the family planning solution first, we note that, once again, the first (horizontal) dimension replicates the chi-square informativeness array, this time perfectly. The fit of the media to the hypothetical square distribution expressed in the chi-square statistic appears to be a major factor underlying the similarity of media as ascertained by their perceived content. This finding gives us further confidence that the chi-square informativeness perspective is a fruitful one for describing the media with regard to this topic. Again, this perspective fails to shed any light on the informativeness of channels for job attribute informations.

Now comparing the two solutions, we see that the audio-visual-print dimension does not appear in them. Thus, this dimension seems to be useful for describing the frequency of recall of messages, but not their content. Looking further, however, we do find patterns which hold across the solutions. Two axes may be seen in each, one running through television, radio, and billboards on one side, and the second through books, magazines, and film on the other. Newspapers lies between these clusters in both solutions. It appears that film, books, and magazines as well as television, radio, and billboards hold a certain character across topics with regard to content. We could regard this stability as one aspect of informativeness -- the kind of information carried by the media. That is, books, film and magazines would probably cover a broader range of information, while the others concentrate on a few types of messages.

Thus we have found in the content similarity analysis that the description of media is more complex when content relationships are considered. Moreover, certain stabilities are seen across topics in terms of the configurations of media. The chi-square informativeness perspective helps us to understand the MDS solution for family planning while it does not help for jobs -- replicating our earlier finding. Other useful dimensions are distinguished which hold across topics and the audio-visual -- print dimension is found not to obtain when content similarities are considered.

IV. Summary of MDS Analysis

We have been partially successful in utilizing MDS to replicate our earlier chi-square analysis. The replication is made for one topic, both with regard to use and content similarities. Apart from this we have discovered other dimensions and configurations which help us in characterizing media. Important topic differences have been noted, as well as patterns which hold across topics.

Perhaps most important, we have dealt with the issues of how media may be similar or different in the use vs. content distinction. Where we have failed to replicate earlier findings or shed light on the description of media, we have elucidated a fruitful technique and pointed up theoretical distinctions which should be taken into account by anyone who hopes to describe media.

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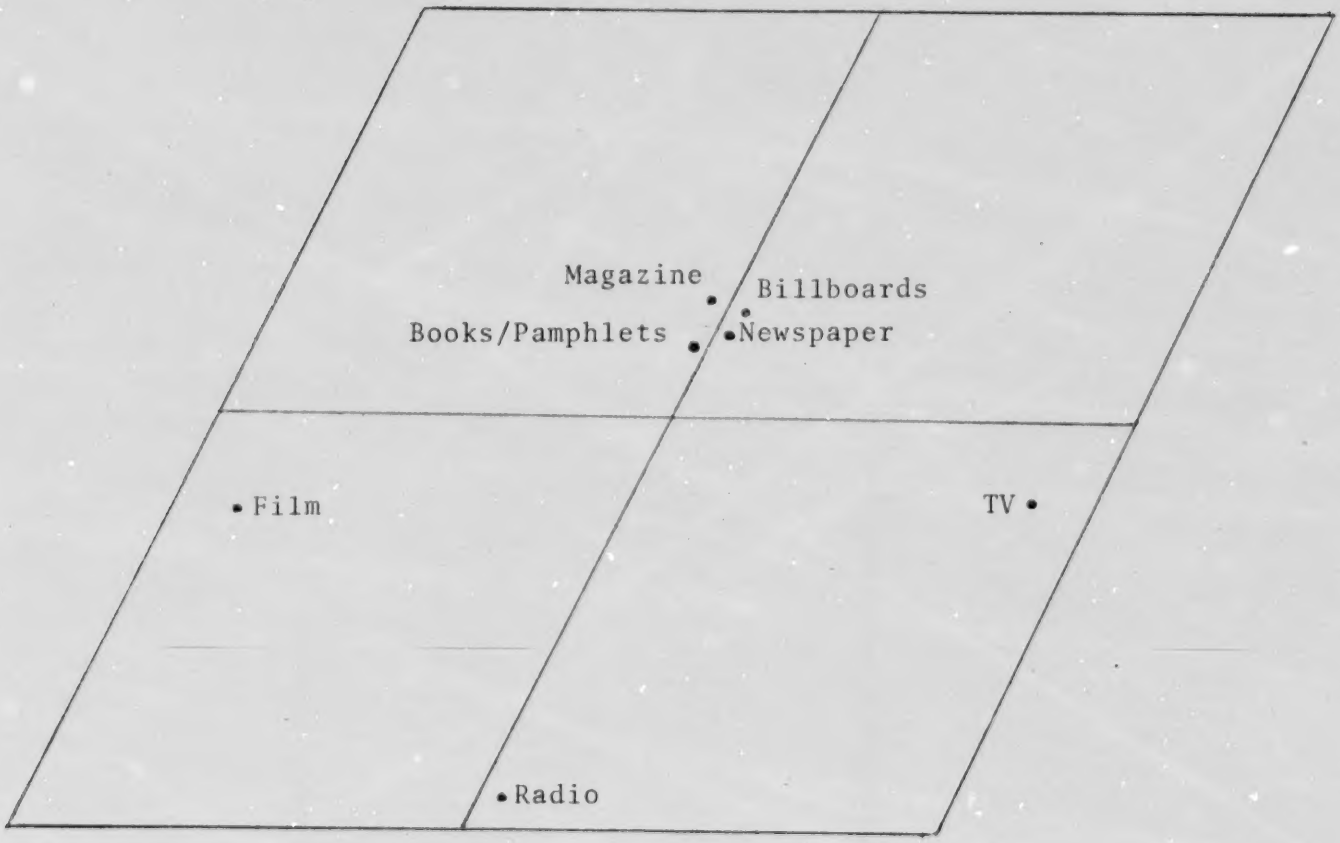
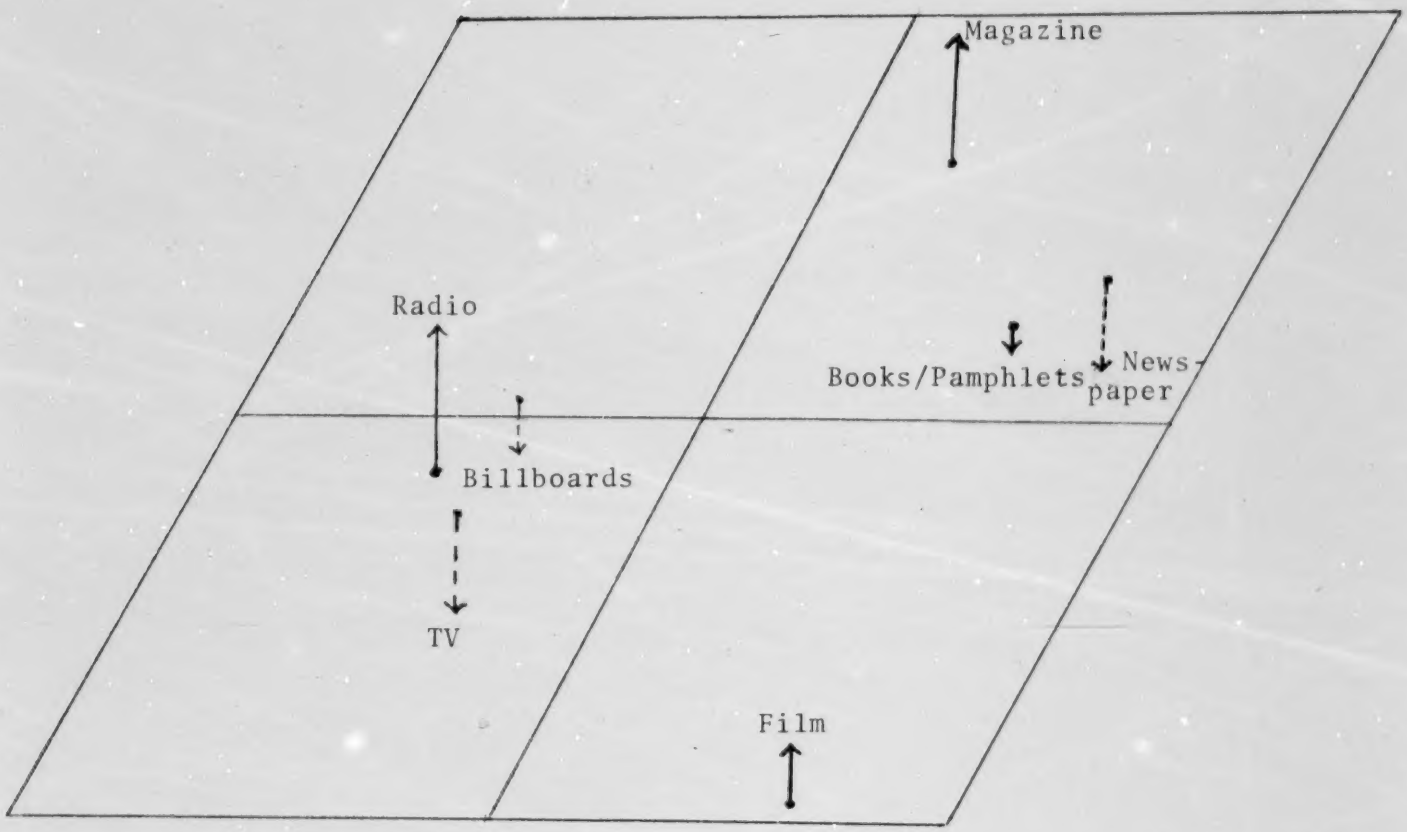
Figure 1: Multidimensional Scaling Solution for Family Planning Usage Similarities



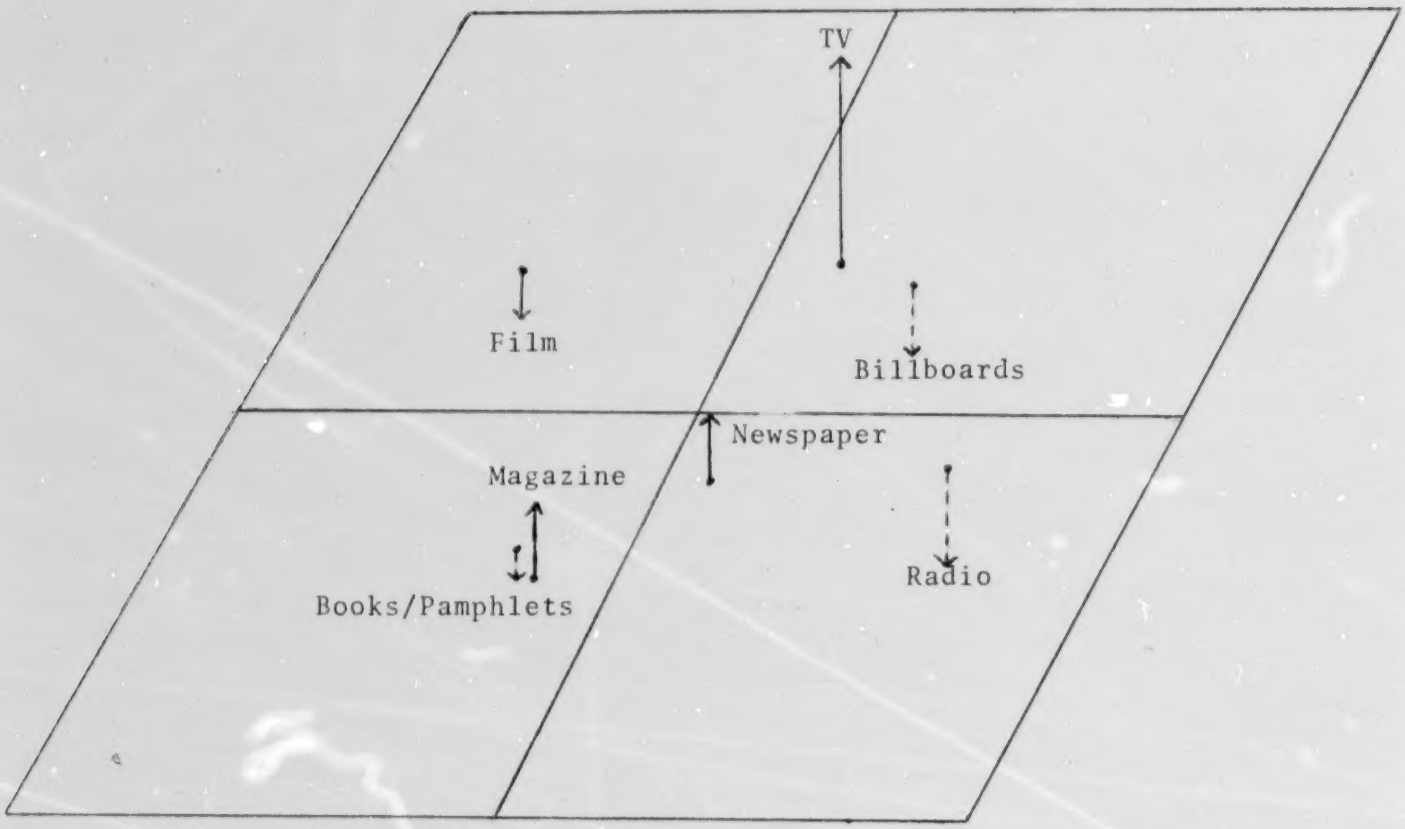
Stress for 2 dimensional solution = .009 (formula 2)

Figure 2: Multidimensional Scaling Solution for Job Usage Similarities



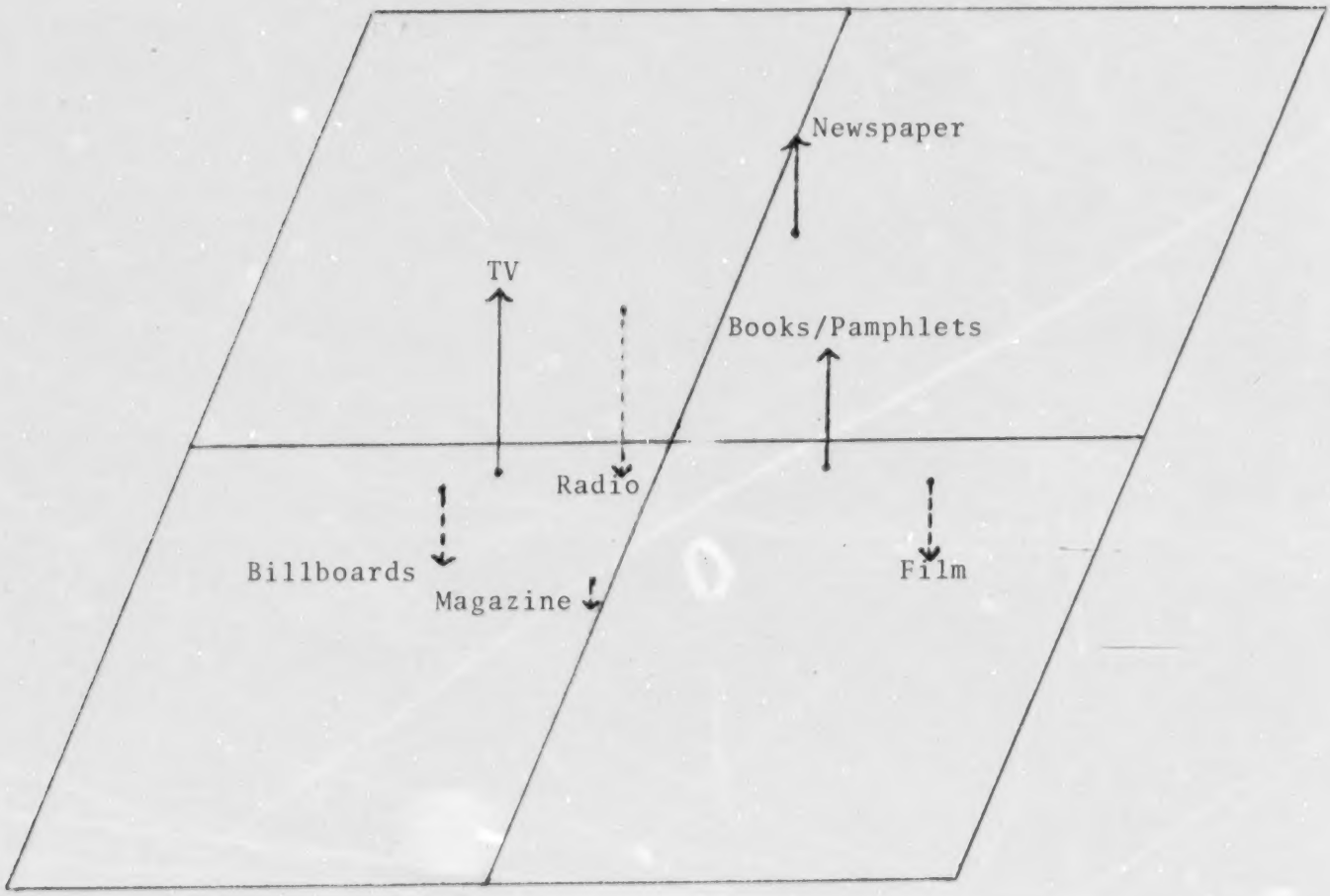
Stress for 3 dimensional solution - .005 (formula 2)

Figure 3: Multidimensional Scaling Solution for Family Planning Content Similarities Data



Stress for solution in 3 dimensions - .029 (formula 2)

Figure 4: Multidimensional Scaling Solution for Job Content Similarities Data



Stress for Solution in 3 dimensions = .091 (formula 2)